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ABSTRACT

This document presents a sample of the Arkansas science curriculum and identifies the content standards for physical science systems, life science systems, and Earth science/space science systems for sixth grade students. Each content standard is explained and includes student learning expectations, sixth grade benchmarks, assessments, and strategies and activities. (YDS)

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Sixth Grade Level Science Sample Curriculum

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Sixth Grade Level Science

STRAND 1: PHYSICAL SYSTEMS
CONTENT STANDARD 1
Students will demonstrate an understanding of physical systems as a process of inquiry.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
PS.1.1. Understand that the laws of science are universal.	Students understand that physical phenomena should behave the same on other planets as they do on Earth. Students can distinguish between a hypothesis and a scientific theory.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Have students discuss the throwing of a ball on Earth and how this would differ on the moon. What would account for the differences? Discuss an experiment and identi fy a possible hypothesis and the difference between it and the overall theory concerning the experiment.
PS.1.2. Understand that a scientific theory is based on current, accepted evidence and is used to make predictions.	Students understand that scienti fic theories can be used to predict future physical events. Students understand that before ideas (hypotheses or theories) are accepted by other scientists, the ideas are reviewed and tested many times.	Statewide Test Teacher-made Test Teacher Observation Portfolio Demonstration Log/Journal Essay Writing	Have students discuss the predictive power of a scientific theory. Discuss with students the methods and practices of printing, distribution, and review of scientific research.
PS.1.3. Generate written conclusions based on evidence acquired through experimentation.	Students reach independent conclusions about experiments. Individual conclusions are compared and reviewed in class.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	From one of the experiments done in class, students will reach individual conclusions based on the results. These conclusions are compared and reviewed in class.
PS.1.4. Interpret scientific information from graphs and charts.	Students form interpretations based on information in graphs and charts.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Have students collectively and individually interpret charts and graphs and review interpretations.

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STRAND 1: PHYSICAL SYSTEMS
CONTENT STANDARD 2
Students will explore, demonstrate, communicate, apply, and evaluate the knowledge of physical systems.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
PS.2.1. Demonstrate an understanding of the *states of matter* and describe the various combinations of matter (*mixtures* and *compounds*).	Students can describe and classify matter in terms of elements, compounds, and mixtures.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students write about elements, compounds and mixtures. What makes them different? Distinguish between an element and a compound.
PS.2.2. Identify and describe the properties of an atom.	Students should be able to identify where in atom electrons, protons, and neutrons are found. Students understand that atoms can combine to form molecules with properties different from the atoms'.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students design a map to find their way around an atom and label the parts. Have students compare H_2 and O_2 with H_2O or C_4 and O_2 to CO_2, etc.
PS.2.3. Investigate the *periodic chart*.	Students know that elements are grouped by like characteristics. Students should be able to find common elements on a periodic chart.	Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students arrange elements by their atomic number. Have students find common elements on the periodic chart. Have students develop cards for each of the elements to be placed on a large periodic chart for the class to use.
PS.2.4. Experiment and identify *physical* and *chemical changes*.	Students (given materials) can set up and conduct an experiment that shows a physical change or a chemical change. Students should be able to describe and give examples of how elements can combine to form new substances which often have different properties.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students set up and conduct an experiment to show a physical and a chemical change. Describe and give examples of how elements can combine to form new substances which often have different properties.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
PS.2.5. Examine the sources and analyze the preservation of energy resources.	Students research print and nonprint resources for ways to preserve limited energy resources.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students use print and nonprint resources to prepare a paper or presentation about preserving limited energy resources. Have students write a fiction piece about what could happen if present energy resources are depleted.
PS.2.6. Experiment with *forces* (*gravity*, *magnetism*, and *electricity*).	Students can set up examples of forces in magnets and electricity (using magnets, small batteries, wire, and a magnetic compass. No AC current).	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students conduct teacher-directed experiments with gravity, magnetism, and electricty (e.g.., pass a magnet and a looped wire connected to the poles of a small battery near a magnetic compass).
PS.2.7. Investigate the laws of motion.	Students can give examples of inertia, gravity, friction, mass, and force in everyday life.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students participant in an egg drop contest to determine which container preserves the egg best. Have students give examples of inertia, gravity, friction, mass, and force in this activity.
PS.2.8. Demonstrate and communicate the relationship between magnetic fields and electric currents.	Students can set up examples of forces in magnets and electricity (using magnets, small batteries, wire, and a magnetic compass. No AC current).	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students complete an electric circuit with a D battery and a copper wire and pass a magnetic compass near the circuit and record the results.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
PS.2.9. Introduce the *electromagnetic spectrum* (radio, infrared, visible light, and ultraviolet *waves*, x-rays).	Students describe the results of light passing through a small slit when shown upon a screen. Students can name some of the invisible parts of the electromagnetic spectrum.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students discuss or illustrate the results of their experiments with light. Have students identify radio waves, infrared rays, ultraviolet rays, x-rays, gamma rays, and cosmic rays. Have students iscuss how science uses the invisible spectrum.
PS.2.10. Investigate and identify conductors and insulators of heat and electricity.	Students can name objects that are conductors of electricity and objects that are insulators of electricity.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	From items placed on a table, have students name objects that are conductors of electricity and objects that are insulators of electricity.
PS.2.11. Distinguish energy transfer (*conduction, convection, and radiation*).	Students can model examples of convection and radiation of heat.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Students can design models or draw examples of convection and radiation of heat (warm air rising, cold air sinking, heat produced from light bulbs, etc.).
PS.2.12. Investigate sound *waves* and gamma rays.	Students can experiment with sound waves.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students connect string or wire between the cans and describe how and why it works. Have students write about the phone they developed and how it works.

STRAND 1: PHYSICAL SYSTEMS CONTENT STANDARD 3 Students will demonstrate an understanding of the connections and applications of physical science.			
Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
PS.3.1. Design and conduct different kinds of scientific investigations to answer different kinds of questions.	Students design and conduct experiments.	Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students design and gather data about the total electrical usage in their building in a specific period of time.
PS.3.2. Demonstrate how physical science is connected to mathematics (analyze collected data).	Students conduct several trials of data and average the data.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students collect at least 15 sets of data from an experiment and average the data and draw conclusions based on the data.
PS.3.3. Apply multiple strategies to problem solving.	Students develop strategies to solve problems and compare answers with other students.	Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have separate teams gather research on the same topic and compare results.
PS.3.4. Use appropriate equipment, tools, techniques, technology, mathematics, and technical writing in scientific investigation.	Students are aware of and practice safety rules and can identify these rules on exams. Students can use glassware, batteries, electrical connections, magnifiers, magnets, light bulbs, chemicals, Genecons, compasses, etc. as part of physical science experiments and can write about their investigations.	Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students identify teacher-made science safety rules. Train students to properly use scientific equipment Have students use scientific equipment on a regular basis to conduct experiments in their classrooms.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
PS.3.5. Investigate a variety of careers related to physical science.	Students can identify people in their community who rely on knowledge of the physical sciences in their jobs.	Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Invite community members to talk about physical science skills needed in their jobs.
PS.3.6. Acknowledge the impact of scientific discoveries upon society.	Students can discuss the impact of space exploration on society.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students discuss how space exploration and the accompanying technology have affected American life.
PS.3.7. Recognize that scientific discovery has been influenced by historical events.	Students can identify events surrounding the development of transportation systems.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Using print and nonprint resources, students research historical events pertaining to the development of transportation systems.

STRAND 2: LIFE SCIENCE SYSTEMS CONTENT STANDARD 1 Students will demonstrate an understanding of life science as a process of inquiry.			
Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.1.1. Recognize that science deals only with inquiry about the natural world.	Students are able to distinguish between science and non-science concepts and questions.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students propose and discuss questions that science can and cannot answer and why.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.1.2. Interpret scientific information from graphs and charts.	Students form interpretations about graphs and charts.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students individually interpret teacher-assigned graphs and charts to obtain information. Have them compare and review results with the rest of the class.
LS.1.3. Conduct investigative science through use of the *scientific method*.	Students can set-up experiments or observations based on the scientific method.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students set up an experiment or observation and have the teacher evaluate the effectiveness of the study.
LS.1.4. Generate conclusions based on evidence acquired through experimentation.	Students (as individuals) can form conclusions based on experimental results in LS.1.3. above.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Teacher evaluates the conclusions of students based upon a scoring guide that students have seen.

STRAND 2: LIFE SCIENCE SYSTEMS
CONTENT STANDARD 2
Students will explore, demonstrate, communicate, apply and evaluate the knowledge of life systems.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.2.1. Identify, describe, and explain various types of cells and cell processes.	Students understand the importance of oxygen to living things. Students understand the importance of water, minerals, fats, proteins, and carbohydrates to living things.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Have students describe in writing what would happen to people, trees, flowers, and catfish if oxygen suddenly disappeared. Divide the class into five teams. Have each team discuss the importance of water, minerals, fats, proteins and carbohydrates to living things and then illustrate these important points.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.2.2. Describe similarities and differences between single celled and multicellular *organisms.*	Students can recognize cells in tissues under a microscope.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Use a microprojector or video camera to view cells in tissue. Have students make and label drawings of what they view.
LS.2.3. Arrange *organisms* into groups according to similarities and differences.	Students can identify examples of Arkansas seed plants, mollusks, arthropods, fish, amphibians, and mammals. Students can arrange examples of bacteria, fungi, and plants into their correct groups.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Create a mural of examples of chordates and non-chordates. Discuss the traits of each group and have the students sort the pictures in groups. Have students sort according to traits examples of Arkansas seed plants, mollusks, arthropods, fish, amphibians, and mammals.
LS.2.4. Identify the requirements for living *organisms.*	Students can explain why animals need space and shelter to thrive.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Have students use print and nonprint resources to research how much space various animals need to live and thrive. Have students incorporate this information into an essay on the need for space and shelter.
LS.2.5. Explain life cycles of various *organisms.*	Students can explain the life cycle of specific animals.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Explain in writing or by illustration the life cycle of a brown bear, a fence swift lizard, and a robin.
LS.2.6. Describe the parts of the human body systems and determine their function.	Students can describe the route oxygen travels from the nose to the body cells where it is converted to energy. Students can describe and trace the route food takes until it leaves the body. Students can describe neural paths.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Draw the outline of one of the students on butcher paper. Draw the organs and paths that oxygen, food, and nerve impulses follow.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.2.7. Describe how heredity and environment influence/determine characteristics of an *organism*.	Students can describe how genes produce traits. Students give examples of animal offspring learning from their parents.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students use a simple Punnett Square to determine inherited trains of offspring. Discuss with students how young predators learn to hunt from their parents.
LS.2.8. Recognize that reproduction is a characteristic of all living *organisms* and is essential to the continuation of life.	Students can describe fertilization and development in animals.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Use models or pictures and have students point out changes that occur as an organism grows and develops.
LS.2.9. Explain how physical and/or behavioral characteristics of *organisms* help them to adapt and survive in their environments	Students can describe what physical and behavioral characteristics plants have that allow them to survive seasonal changes.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Demonstration Log/Journal Essay Writing	Have students describe the physical and behavioral characteristics of ferns, roses, pine trees, and oak trees that allow them to survive seasonal changes.
LS.2.10. Describe how genetic material changes through time producing new species while some older species die out and become extinct.	Students understand that over long periods of time the genes in a population of organisms change because of the changes in the DNA. Students understand that there have been large extinctions caused by planetary impacts, climate changes, food sources depletion, and loss of habitat, and that these provided different environments.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students research and discuss how an organism, such as the horse, changed overtime before the appearance of man. Have students compare the wooly mammoth to present day elephants. Have students find charts on the great mass extinctions and list the major changes in life on Earth as a result of these events. Have students discuss possible reasons dinosaurs no longer exist.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.2.11. Analyze ecosystems in terms of population relationships, *food webs, energy* flow, and *biotic succession.*	Students can identify food webs, energy flow, and succession in an environment.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students observe over time a classroom terrarium. Have them identify the food webs, energy flow, and succession within the terrarium and write about them in student journals.
LS.2.12. Evaluate human impact on the environment.	Students can evaluate the impact of their community's activities on the environment.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students evaluate each week the impact on the environment of the community's generation and treatment of solid waste.

STRAND 2: LIFE SCIENCE SYSTEMS CONTENT STANDARD 3 Students will demonstrate an understanding of the connections and applications in life sciences			
Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.3.1. Design and conduct life science investigations to answer different kinds of questions.	Students design an investigation to solve a problem in their community.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students identify a problem and design an investigation to solve the problem.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
LS.3.2. Correlate life science activities to other curricular areas (e.g., language arts, mathematics, social studies).	Students write clearly about science. Students write about the importance of mathematics to scientific research. Students write about the importance of events of history in shaping scientific discoveries.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Compare scientific writing and fiction. Possible considerations for discussion are • Why is it important to express oneself clearly in writing scientific papers? • Why are mathematics and science closely related? • How have events in history shaped scientific developments?
LS.3.3. Apply multiple strategies to problem solving.	Students develop multiple strategies to solve problems.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have teams of students select a science problem and use print and nonprint resources to research solutions.
LS.3.4. Use appropriate equipment, tools, techniques, technology, mathematics, and technical writing in scientific investigation.	Students are aware of safety rules and can identify these rules on exams.	Statewide Test Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Test students on science class safety rules. Teacher observes whether students handle science equipment with care and skill.
LS.3.5. Investigate a variety of careers related to life sciences.	Students can Identify life science professions.	Teacher-made Test Portfolio Log/Journal Essay Writing	Have students research the careers of life scientists, such as botanists, zoologists, and microbiologists.

STRAND 3: EARTH/SPACE SYSTEMS CONTENT STANDARD 1 Students will demonstrate an understanding of the inquiry process through the study of earth and space systems.			
Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.1.1. Identify the components of Earth (rocks, water, and air) and their properties.	Students can identify the layers of Earth.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students create a model the layers of the Earth.
ES.1.2. Understand that Earth and objects in space constantly undergo changes and/or cycles, which can be observed and measured.	Students can explain the Big Bang Theory in broad terms.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students write about the Big Bang theory of the expanding universe.
ES.1.3. Generate conclusions based on evidence acquired through experimentation.	Students draw conclusions from their experiments.	Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Log/Journal Essay Writing	Have students draw conclusions and compare results after conducting an experiment.
ES.1.4. Interpret scientific information from graphs and charts.	Students form interpretations based on graphs and charts.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students form conclusions about teacher-selected graphs and charts and compare the interpretations as a class.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.1.5. Identify and classify rocks and *minerals*.	Students can classify rock into sedimentary, igneous, and metamorphic groupings. Students can classify minerals by hardness.	Statewide Test Teacher-made Test Teacher Observation Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students classify rock into sedimentary, igneous, and metamorphic groupings. Have students classify minerals by hardness using simple materials to construct a hardness scale.
ES.1.6. Understand the relationship between Earth and objects in space.	Students demonstrate an understanding of the relationship between the Earth and objects in space.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students construct a classroom model of our galaxy and Earth's location within this galaxy.

STRAND 3: EARTH/SPACE SYSTEMS CONTENT STANDARD 2 Students will explore, demonstrate, communicate, apply and evaluate knowledge of the properties of earth and space systems.			
Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.2.1. Investigate the formation and properties of rocks (*igneous, sedimentary,* and *metamorphic*), *minerals*, and *fossils*.	Students can describe the crystal structure of common minerals and how they were formed. Students can identify common minerals.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students design a model or illustration to show the crystal structure of common minerals and how they form. Have students perform hardness and streak tests to identify minerals from teacher-selected specimens from Arkansas.
ES.2.2. Understand the relationship, which exists between rock formation, fossil evidence, and geological history and age of the Earth.	Students understand the age of the Earth and when living things first appeared on Earth 3.5 billion years ago.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students onstruct a wall chart with illustrations to show a timeline of the age of the Earth and the appearance of living things at different intervals.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.2.3. Investigate how Earth's internal processes affect external features (volcanoes, earthquakes, mountain formation, etc).	Students can explain the processes related to the formation of mountains, earthquakes, and volcanoes.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students use print and nonprint resources to research and report on the New Madrid earthquake. And its effect on people. Have students locate where volcanoes are found and why on a world map. Be sure they discuss plate boundaries.
ES.2.4. Understand the effects of *weathering* and *erosion* on the Earth's surface.	Students can explain the process of erosion.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students set up working models showing erosion and how it occurs.
ES.2.5. Describe and model the natural divisions of Arkansas.	Students can name the land uses and history in each of the six natural divisions of Arkansas.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have six student teams take a research "field trip" to one of the natural divisions and report on the land uses and history of their division.
ES.2.6. Describe the energy transfer within the *atmosphere* as it relates to the development of weather and climate patterns.	Students can describe how the energy transfer within the atmosphere produces our weather and climate.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students create a model of the Earth and the Sun and how it produces our weather and climate. Have students use the model to show how air masses circulate on the Earth.
ES.2.7. Explain and illustrate the *water cycle*.	Students demonstrate with a model the water cycle by using a heat source to drive the process.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students build models of the water cycle using a heat source to drive the model under a cooling surface above. (See resource list.)

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.2.8. Model and explain how the Earth's shape and tilt result in different seasons.	Students can describe what produces the different seasons on Earth (tilt of the Earth).	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Students research the Earth's tilt and air movements and how these affect the seasons.
ES.2.9. Investigate the predictable motion of objects in space in explaining phenomena such as day, night, moon phases, ocean tides, and eclipses.	Students can design a model to illustrate what causes tides on Earth. Students can design a model to illustrate what causes lunar eclipses.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students design a model to illustrate what causes tides on Earth. Have students design a model to illustrate what causes moon eclipses.
ES.2.10. Analyze how the features of the oceans affect humans.	Students can describe how man has depended upon the ocean for resources.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students research how man has used the ocean for food, energy, and transportation. Write an expository article illustrating how man has depended upon the ocean for resources.
ES.2.11. Compare the ability to support life on Earth and other objects in space.	Students can compare and contrast the life supporting abilities of the Earth and the International Space Station.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students compare and contrast the life supporting abilities of the Earth and the International Space Station.
ES.2.12. Explain and compare the properties (*gravity*, size, shape, distance, and color) of objects in the *solar system*.	Students can describe the formation of our solar system. Students can describe the characteristics of objects in our solar system.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students use the Internet to research the formation of the solar system. Have students depict the formation and characteristics of stars, planets, moons, comets, etc.

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Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.2.13. Explore past, present, and future space technology.	Students can describe the present and future efforts of NASA.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students research the Internet for NASA efforts and turn in research papers on these efforts. Discuss where they think future funding should go in the NASA program.
ES.2.14. Relate the physical characteristics of the sun to other stars.	Students can compare the life cycle of our sun to other stars.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Have students design a skit comparing the life cycle of our sun to other stars.

STRAND 3: EARTH/SPACE SYSTEMS CONTENT STANDARD 3 Students will demonstrate an understanding of the connections and applications of earth /space systems.			
Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.3.1. Design and conduct scientific investigations to answer different kinds of questions.	Students can design and conduct a scientific experiment.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal	Have student teams design and conduct a scientific experiment (e.g., measure the average proportions of sand, silt, and clay).
ES.3.2. Apply multiple strategies to problem solving.	Students develop multiple strategies to solve problems.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have student teams research a problem for a solution and then discuss which solution is the most scientifically sound.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.3.3. Use appropriate equipment, tools, techniques, technology, mathematics, and technical writing in scientific investigations.	Students are aware of and practice safety rules and can identify these rules on exams.	Statewide Test Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration	Have students take written tests on safety rules and practice them in laboratory activities.
ES.3.4. Investigate a variety of earth science related careers.	Students research careers in astronomy and space flight.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Have students research earth science careers and report to class.
ES.3.5. Construct models of earth science systems and make real world applications.	Students build models to show how different building material and structures are affected by earthquakes.	Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration	Use Lincoln Logs or model building kits to build structures on plywood that can sit on an inner tube, strike the plywood to test shaking effects of earthquakes.
ES.3.6. Analyze the impact of human activities on the Earth's *crust, hydrosphere, atmosphere,* and *biosphere* (e.g., climate change, *greenhouse effect,* global warming, ozone depletion, and *UV radiation*) and demonstrate methods of conservation and recycling of the Earth's resources.	Students can name and describe man's activities that pollute the Earth. Students can name conservation activities that would help the environment.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Log/Journal Essay Writing	Have students compare and contrast the government, business, and environmental awareness groups' views on the environment. Have students discuss and select solutions for environmental problems.
ES.3.7. Explore the impact of space technology on society.	Students can identify how space technology has improved communication on Earth.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal	Have students use print and nonprint resources to research the impact of space technology on communication and illustrate it in the classroom.

Student Learning Expectations	Sixth Grade Benchmarks	Assessments	Strategies/Activities
ES.3.8. Illustrate the positive and negative effects of human use of natural resources on Earth.	Students can describe how man uses natural resources in a positive and negative manner.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Have students use print and nonprint resources to research ways that people use natural resources.
ES.3.9. Measure weather conditions using appropriate equipment.	Students can use appropriate materials and equipment to predict the weather and to solve earth science problems.	Teacher-made Test Teacher Observation Portfolio Checklist Performance-based Test Exhibition Demonstration	Students can effectively and safely use weather charts, thermometers, barometers, wind indicators and computer programs to predict the weather and to solve earth science problems.
ES.3.10. Calculate the gravitational forces of objects in space.	Students can describe why the moon circles the Earth.	Statewide Test Teacher-made Test Teacher Observation Portfolio Performance-based Test Exhibition Demonstration Log/Journal Essay Writing	Ask students why the moon does not crash into the Earth. Have them research the answer.

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